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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/664,827	09/19/2000	Glen H. Erikson	E1047/20044	4947

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EXAMINER	
CHUNDURU, SURYAPRABHA	
ART UNIT	**PAPER NUMBER**
1637	28

DATE MAILED: 10/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/664,827	ERIKSON ET AL.	
	Examiner	Art Unit	
	Suryaprabha Chunduru	1637	

-- The MAILING DATE of this communication appears on the c ver sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-52* is/are pending in the application.

4a) Of the above claim(s) *26-49 and 52* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25,50 and 51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. Applicants' response to the office action and amendment (Paper No. 27) filed on May 30, 2003 has been entered.

2. Claims 1-25, 50, 51 are considered for examination. Non-elected claims 26-49, and 52 are withdrawn from consideration.

3. This application is filed on September 19, 2000and claims no priority.

Response to Arguments

4. Applicant's response to the office action (Paper No.8) is fully considered and is found persuasive.

5. With respect to the rejection made in the previous office action under 35 U.S.C. 103(a) over Eckhart et al. in view of Deng et al., applicants amendment and arguments have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 7-9, 13-14, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by McGavin et al. (J. Mol. Graphics, Vol. 7, pages 218-232, 1989).

McGavin et al. teach a multiplex structure of claim 1, using computer graphics wherein McGavin et al. disclose a multiplex structure comprising a first, a second, a third and a fourth sequence of nucleobases wherein four strands interact specifically with each other forming

a multiplex structure solely through Watson-Crick pairing (see page 226, column 1, paragraphs 2-4) in which Watson-Crick duplexes are paired specifically about a dyad axis coincident with a common long molecular axis and with major grooves in continuous and specific contact (see page 230, column 1, paragraphs 1-3, page 225, column 1, paragraph 2, column 2, paragraph 3).

With regard to claim 2, McGavin et al. teach that the multiplex structure comprises an artificial or synthetic quadruplex (see page 228, column 1, paragraphs 2-4);

With regard to claims 3-4, McGavin et al. teach that the multiplex structure comprises a nucleic acid (DNA and RNA) (see page 225, column 2, paragraph 3);

With regard to claims 7, 9, McGavin et al. teach the multiplex structure any one strand alternates between two strands in anti-parallel orientation (see page 220, color plate 3a and 3b,page 228, column 2, paragraphs 3-8);

With regard to claim 8, McGavin et al. teach Watson-Crick duplexes are paired specifically about a dyad axis coincident with a common long molecular axis and with major grooves in continuous and specific contact indicating major groove of first-second strand duplex is placed in the major groove of third-fourth strand duplex (see page 230, column 1, paragraphs 1-3, page 225, column 1, paragraph 2, column 2, paragraph 3);

With regard to claim 13-14, McGavin et al. teach that the multiplex structure is substantially free of Hoogsteen bonding and free of G-G quartets (see page 226, column 1, paragraph 2, column 2, paragraph 2);

With regard to claim 19, McGavin et al. teach that the multiplex structure is free of a solid support (see page 226, column 2, paragraphs 3-5).

Thus the disclosure of McGavin et al. meets the limitations in the instant claims.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5, 10-12, 15-18, 20-25, 50-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGavin et al. (J. Mol. Graphics, Vol. 7, pages 218-232, 1989) in view of Erikson et al. (USPN. 6,420,115).

McGavin et al. teach a multiplex structure of claim 1, using computer graphics wherein McGavin et al. disclose a multiplex structure comprising a first, a second, a third and a fourth sequence of nucleobases wherein four strands interact specifically with each other forming a multiplex structure solely through Watson-Crick pairing (see page 226, column 1, paragraphs 2-4) in which Watson-Crick duplexes are paired specifically about a dyad axis coincident with a common long molecular axis and with major grooves in continuous and specific contact (see page 230, column 1, paragraphs 1-3, page 225, column 1, paragraph 2, column 2, paragraph 3).

However, McGavin et al. did not teach multiplex structure comprising a nucleic acid analogue, minor groove, genomic DNA or PCR amplified products, electrically conductive solid support.

Erikson et al. teach a multiplex structure comprising (i) RNA, genomic DNA sequences (see column 4, lines 58-66); (ii) comprises nucleic acid analogue (see column 3, lines 1-5) (iii) multiplex formation with major and minor grove binding proteins which facilitate appropriate placement of nucleic acid strands in major groove (see column 6, lines 57-67); (iv) nucleic acid strands of multiplex comprise 5 to 50 base pairs long and 8 x $3.3x10^9$ base pairs long nucleic acid strands (see column 3, lines 13-15); (v) nucleic acid sequences contain 25% to 75% purine bases and 75% to 25% pyrimidine bases in any order (see column 3, lines 10-12); and (vi) nucleic acid strands could be obtained by PCR amplification (see column 6, lines 19-20); (vii) concentration of probe or target sequence not more than $5x\ 10^{-10}$ M (see column 21, lines 33-39); (viii) multiplex structure could bound to a solid support (biochip) (see column 4, lines 25-26).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify a multiplex structure as taught by McGavin et al. with the multiplex forming parameters as taught by Erikson et al. which facilitate Watson-Crick base pairing nucleic acid strands in a multiplex structure because Erikson et al. taught that "specific binding between complementary bases occurs under a wide variety of conditions having variations in temperature, salt concentration, electrostatic strength and buffer composition. Unlike many Hoogsteen-type multiplexes, which are unstable, the Watson-Crick multiplexes are stable over a wide range of conditions, and does not require longer reaction times" (see column 6, lines 40-56). An ordinary practitioner would have been motivated to combine the multiplex

structure of McGavin et al. with the inclusion of parameters or reaction conditions as taught by Erickson et al. in order to achieve the expected advantage of developing a more stable structure because the inclusion of the parameters as taught by Erikson et al. would facilitate Watson-Crick base pairing and enhance the stability of the multiplex structure.

Conclusion

No claims are allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suryaprabha Chunduru whose telephone number is 703-305-1004. The examiner can normally be reached on 8.30A.M. - 4.30P.M, Mon - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 703-308-1119. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3014 for regular communications and - for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

Suryaprabha Chunduru
October 27, 2003

JEFFREY FREDMAN
PRIMARY EXAMINER